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The High School and Research

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The HIGH SCHOOL JOURNAL

SAMUEL M. HOLTON, *Editor*
Professor of Education, University of North Carolina

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The Teacher and Educational Research

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THE THEME of this paper is that the connection between educational research and teaching should be close, since research determines whether in practice education functions as a profession or as something else. An occupation is dignified by the term professional if 1) practices are based upon a body of organized abstract knowledge, 2) knowledge is of sufficient scope and complexity so as to be mastered only over an extended period of time by individuals selected because of their aptitude and motivation, and 3) those who master this knowledge are thereby able to perform an essential public service better than those who do not have this knowledge. The last two points have been generally understood, but the first one has been widely misunderstood. Here the key words are "organized", and "abstract." Organized means knowledge connected with other knowledge. The more connections, the greater the organization. Tricks of the trade, interesting but isolated facts, and specific know-how is usually not connected with other knowledge. The incantations and rituals of a witch doctor could conceivably involve as much cognitive strain to master as the organized knowledge of a physician. However, because of the scarcity of connections with other knowledge, particularly the vast body of organized knowledge related to the cause and treatment of illness, the ritual of the witch doctor, though impressive, may have little effect on the genuine illness. In other words the witch doctor typically cures by accident, the physician by design. Similarly, an untrained person might teach successfully by accident, the professional teacher does so by deliberate design.

Knowledge is most adaptable for use when it is organized. A common misconception is one relative to the implications of "abstract" as opposed to "practical." Some individuals seem to take special pride in declaring themselves "practical" as opposed to "theoretical" or "abstract" in their point of view. Perhaps a digression to distinguish between "practical" and "abstract" (or theoretical) may be helpful at this point. Practical means "of, pertaining to, or manifested in action; capable of being turned to use; capable of applying knowledge to some useful end." Abstract means "con-

sidered apart from any application to a particular object; ideal; general as opposed to particular; expressing a quality apart from any object."

Among some practitioners "practical" has come to be extolled as useful and relevant to the activity at hand, and "abstract or theoretical" deplored as irrelevant and speculative. These terms reveal major concerns of practitioners (teachers) on the one hand and researchers on the other. A practitioner is concerned with action. Teachers work with pupils as they are, not as they might be under ideal conditions, to attain certain objectives relevant to communication of knowledge, intellectual development, etc. When engaged in an on-going activity one usually cannot stop to deliberate. He must act immediately on the basis of the information at hand. Previous knowledge of the teacher may or may not have prepared him to act wisely. If it has not prepared him, he must guess or improvise. In the absence of relevant knowledge the teacher must use hunches and guesses. With increasing experience the teacher becomes more adept (though not necessarily more accurate) in making these decisions, and taking action. Thus, in the assessment of learning outcomes, the teacher has many alternatives available. These have been built up largely by research on measurement over the past seventy years. In the assessment of the process by which instruction, or classroom learning takes place, vagueness is much greater. In other words, teachers can communicate more clearly when they talk about achievement in a particular subject matter, than when they talk about "methods" of instruction or classroom learning. Within the latter domain, the instrumental responses have not been delineated or clarified. A relevant analogy is found in bridge building. A primitive "practical" bridge builder observes by experience that cables or beams, of a certain size should carry a "normal" load. What "size of beam" or "normal load" mean cannot be explicitly indicated. All of the "practical" bridges are of one style and of a very limited range of structural materials. If the "practical" builder guessed correctly on "size of beam" and "normal load" and their implications for the materials at hand, the bridge stands. If it falls, it is an act of God. In contrast, the designer who knows his abstract engineering mathematics—statics, kinematics, dynamics, strength of materials, etc., computes the stresses on his structure and specifies dimensions of materials that meet the requirements or specifications. If the specifications are reasonably realistic the bridge stands. Guesswork has been elim-

inated except in the matter of the original specifications. There is no restriction as to the nature of the structure. It can contain as many designs as he can think of, and the appropriate dimensions of the various members can still be accurately determined. In some technical fields, as in optics, guesswork has been virtually eliminated. Given the specifications for an optical instrument, a designer can indicate exactly how it should be built and be sure that it will perform as expected. In other fields, as in certain aspects of metallurgy, the extent of guessing is much greater. Pertinent abstract knowledge enables the practitioner to reduce the extent of conjecture and guessing in his practice whether in optics or in education. Pertinent abstract knowledge might be called the irreducible residual of experience. The extent to which practitioners must conjecture and guess in dealing with the problems they must face, indicates the extent to which "practical" considerations outweigh "abstract." These guesses indicated where gaps in knowledge exist, or where research might be well directed.

The point might be put in another way. Practical solutions are immediate and restricted to the particular application or situation. Each individual must begin anew with every new situation. The moment he starts generalizing he ceases to be strictly "practical" and starts to become "abstract" since generalization and abstraction are synonymous in this matter. The attempt to put a value on either "practical" or "abstract" and to disparage the other is pointless. A professional person is familiar with the abstract knowledge of his field and is thereby able to reduce the extent of guessing in his practice.

It is interesting to observe that since World War II technological schools have scrapped the old trades-training approach and have instituted abstract theoretical approaches to the training of engineers. Engineering curricula now make extensive use of intellectual formulations and research that until recently was derided as theoretical. Technology has become abstract in order to cope with the problems it faced in the increasingly complex postwar world. When the world was simpler in structure and when changes came slowly, practical knowledge (immediately useful and situation-bound) was sufficient. When these conditions no longer obtained, man historically developed the professions with their emphasis on abstract organized knowledge. Knowledge is accumulated in the form best adapted for use under a variety of

conditions and circumstances only when it is organized and when it is abstract (generalizable).

Professional persons can be further characterized as practitioners who 1) keep a learning approach throughout their professional life, and 2) are free and responsible individuals who through professional integrity can be depended upon to establish and maintain their standards of performance.

To repeat, the teacher is interested and concerned about educational research because it is basic to the claim of his activity to professional status. The best way to maintain a learning approach is to engage in original work oneself. Not everyone can or should be expected to make original contributions to the accumulated knowledge of the race, but it is a matter of record that the effort increases the scope and, depth of his own knowledge. The disciplined activity, called research, provides motivation to energize, direct and sustain activity aimed at the acquisition and organization of new knowledge.

The professional concerns of the teacher and the educational researchers are so intertwined as to be indistinguishable in terms of mutual responsibilities. Research basically affects the objectives of the profession. Also, the maturity level of the professional practitioner is defined by his responsibility for, and activity relative to, the extension and wise utilization of knowledge. Feelings of good will, good adjustment, good public relations are not enough by themselves to discharge the responsibilities of any profession. This point may be labored by an example from medical practice. A kindly old doctor, of generations past, possessing no knowledge of antibiotics, but strong on empathy and "bedside" manner might make a child's death from pneumonia easier to bear by the parents. However, given the choice, any parent would prefer a modern physician equipped with a knowledge of antibiotics that cure irrespective of the personality and sociability of the practitioner. The example should suggest that professional responsibility is more concerned with the objectives of the practice (whether cure of illness, or instruction) than with narrow immediate situational concerns. Fundamental to carrying out basic responsibility is knowledge—organized, relevant and abstract so that it can be used in a variety of circumstances and situations. Educational research performs its function when it supplies practitioners such organized abstract knowledge. One cannot speak of enforcing standards of intellectual performance unless one is engaged in intellectual ac-

tivity. Practitioners serve the function of trying out new knowledge and providing responsible criticism thereof.

In the remainder of this paper the general characteristics of research, why research is increasingly intruding into the modern world, and finally the responsibilities of the university for educational research are discussed.

Research is basically a means of learning by experience. An individual by himself does not automatically find the most efficient ways of learning from experience. These ways have been developed by the human race and improved over the centuries. Research means learning the most for the least expenditure of time, cost, people and facilities. The poet Coleridge summarized this point by indicating that a pigmy can see farther than a giant, if he stands on the shoulders of the giant. Research provides us with methods of learning more efficiently from experience than we could ever hope to develop within our own life time.

The basic product of research has been indicated as cumulative knowledge. Those who follow are better able to meet their problems because of the work of their predecessors. Newton, one of the greatest intellects of all time, could not solve a problem involving a first-order differential equation that a typical sophomore in a good engineering school can readily solve. Long division, during the Middle Ages when the Roman numeral notation was used, was regarded as an intellectual feat. The impossible of yesterday is often the routine of today.

It would be easy and tempting to extend this list to include the hardware of civilization—the airplane, television, radar, atomic reactors, space satellites, etc. However, hardware is only a by-product of knowledge and research, and should not be confused with the substance. Facts do not become knowledge until they are organized about general principles. When sufficient knowledge accumulates, products such as hardware follow. Thus, Leonardo could not invent the airplane in spite of his manifest interest and ability—the knowledge of light but powerful propulsion was not available. Similarly, Edison could not invent television.

Characteristics that might serve to check upon the maturity level of the products of research include communicability, verifiability, and logical fertility. Communicability means to convey the details, as well as the general notion, of a particular phenomenon. The test of communicability is the correspondence between what is understood by the receiver and what was transmitted

by the sender. When educational researchers talk about measurement of achievement, they communicate more clearly than when they talk about "methods," "teacher competence," "learning," etc. In the former, concepts are more nearly capable of explicit definition. One can point to specific examples, illustrations, etc. In addition, many of the ideas can be put into a logical or a mathematical form. When talking about "methods" researchers have difficulty with the details. General outlines can be described but the details must be left to the conjecture of the receiver because the sender cannot clearly and unambiguously illustrate the implications of the general outline. It seems impossible to communicate details clearly and unambiguously without command of the language of logical relationships and mathematics, and unless we can define the essential details in these terms. Such definition requires that the phenomenon being studied be abstracted in some idealized form. Thus, the physicist speaks of objects falling freely in a vacuum. The measurement specialist speaks of idealized concepts of reliability, validity, etc. Such abstraction involves restriction of the field of interest to the idealized conditions.

Verifiability is a second essential characteristic of knowledge gained by research. If adequate communication has been achieved, the phenomenon in question can be studied by others, and the results either substantiated or refuted. Only knowledge that can stand the test of verification can be considered a dependable product of research. The criterion of verification really serves two purposes: 1) it permits a test of the knowledge, 2) it permits a critical examination of the procedures used in obtaining such knowledge.

The final criterion suggested was that of logical fertility. This criterion indicates the extent to which the new knowledge suggests new ideas, new data, new formulations that had not been thought of, and could not be thought of, previously. Until Maxwell wrote his differential equations on electromagnetic phenomena, no one thought such things as radio waves. Many years later Hertz demonstrated these in laboratory experiments, and not too long thereafter Marconi was using them to transmit messages across the English Channel. Today this has developed into the electronics industry—our third largest. Logical fertility is probably the most significant criterion, and the least realized in educational research.

An important characteristic of civilization is the rate at which existing knowledge is used up, thus bringing about a demand for

new knowledge. Existing knowledge about education is due to inquiries made in the past. What is now known about the definition of objectives in operational terms, the organization of subject matter for optimal presentation and mastery, the teaching of reading, arithmetic, language arts, etc., intellectual growth and development, etc.—is due to the activity of our predecessors. So long as conditions remain constant, and demands on schools, teachers and students do not change too much, knowledge lasts. The cynic says things stay in a rut.

However, we live in a world of rapid far-reaching changes, and the pace is accelerating. Knowledge in the physical and medical sciences seems to be doubling about every 15 years, and that in the social sciences about every 50 years. Research has reached its present level of activity not because the researchers wished it to, but because the pressures of civilization forced it to. For example until recently, coal could be mined, iron smelted and refined, easily located petroleum exploited, with little scientific aid. But it is estimated that within a generation, 75 per cent of electrical energy will need to come from nuclear or solar sources. The problem is further complicated by the fact that our population is increasing at an unprecedented rate, and that all people, including those in the underdeveloped nations are demanding their full share of the world's goods. Inevitably all phases of civilization must become more complex and technical, and demand greater scientific sophistication. There seems to be no indication of return to the "good old" simpler days.

Until Oct. 4, 1957 these facts were largely restricted to circulation among intellectual and public leaders. The advent of Sputnik I dramatized technological changes and forced their realization upon the general public. Almost immediately a flood of criticisms descended upon the schools. Many came from opportunists who saw a chance to obtain publicity. Others came from sincere and interested people. The sudden awareness of rapidity of change in development and the using up of knowledge made many people uncomfortable, and they found a convenient scape goat in the public schools. Among sincere people criticism was more a matter of uneasiness, insecurity, and uncertainty than a belittling of the schools' role.

In the heat of these exchanges education has been accused of not keeping up with the times. In support of this contention, it has been indicated that our physical science and mathematics teaching

materials were at least a generation out of date. Projects initiated by the National Science Foundation, the Ford Foundation and other foundations, were designed to correct this deficiency. Millions of dollars were, and are, being spent on preparation of timely accurate materials in the physical sciences and mathematics. Television, stratovision, varieties of audio-visual aids, and teaching machines are being developed.

Several professional organizations have expressed their concern about educational research through a variety of actions. The O. R. E. (Organization for Research in Education) was established by the National Academy of Sciences and the National Research Council. (It was dissolved when the Council for Research in Education was established). The Council for Research in Education was established by the 21 education organizations to promote the interests of research activity, and now seems to be starting what is hoped will be an active career.

Perhaps the most important boost for educational research was the establishment of the Cooperative Research Program of the U. S. Office of Education, and the various titles within the National Defense Education Act. When the history of educational research is reviewed in the perspective of the future, these federal programs will probably stand out as the most significant milestones in educational research.

Unfortunately these efforts are insufficient to meet the requirements. More research is needed if education is to carry out its responsibilities in our rapidly changing world. To accomplish this it would be necessary to increase the funds and other support devoted to research in education. It should be a matter of concern that agencies outside the field, without any professional commitments are now doing about two-thirds of all the current research in education.

If this ratio ever becomes 100 per cent, education as an occupation will have lost much of its claim to professional status. It is the purpose of this paper to suggest that educational research can be invigorated by establishing strong divisions of educational research at the universities that train the educational leaders. It is difficult to see how a university can reconcile its claims to university status without a strong educational research program. Such a program can not be, and has not been, developed during the spare time of faculty members working on shoe-string finances. While business typically spends between five and seven per cent of its

total operating budget on the average for research, the *rate* of expenditure for educational research is only one-fortieth as large.

A strong university educational research program can best be developed through an organization devoted to that goal, properly staffed, and adequately supported. Such an organization would:

1. Provide a group of specialists who can understand research in the behavioral sciences as well as in education, and can interpret it to teachers, administrators, and faculty colleagues. This means dissemination of research findings that require a level of understanding in mathematics, strategy and tactics of research, and the substantive content of the behavioral sciences far beyond that of the typical educational researcher. These are people who are primarily researchers, and secondarily, practitioners. Their selection and preparation will of necessity differ from that of the typical practitioner. In fact it will be more nearly congruent with that of their counterparts in the behavioral sciences than now.

Only these people can understand what others like themselves are doing. The research organization can make this understanding available through seminars, consultation and publications. These people can communicate the bases that distinguish good research from poor research, and over a period of time help educate their colleagues to discriminate better.

2. Translate laboratory findings, or basic research findings, obtained under rigidly restricted conditions to conditions that obtain in a typical classroom within the state. This process involves besides understanding of the laboratory research, an ability to translate findings and implications into classroom experiments. Again the personnel involved are those with a special training, especially in the design and execution of experiments, that is not currently available among practitioners. An interesting parallel may be drawn with Agricultural Experimental Stations of the respective states. As a nation we have been more concerned about the improvement of hogs, chickens, and grains than we have about the improvement of education of our children. The result is that we know a good deal more about the growth and development of hogs, etc., than we do about the intellectual growth and development of our children.

3. Help school systems do their own research on problems that primarily affect their own local interests. This help is best given by adequate selection and preparation of local personnel with consulting help to develop their proficiency. It is a waste of state

university funds, to perform these services directly for local school systems because this knowledge is usually only of local utility (i.e., school survey, etc.), and funds are never sufficient to perform all of the local services that one is called upon to perform. To do this work only for a few schools is to practice discrimination. However, the worst feature of doing the work directly is that it encourages a dependency relationship, and local control of schools breaks down whenever dependency is encouraged.

4. Make original contributions to knowledge. It seems reasonable, that if one constantly uses knowledge from the research pool, he has an obligation to contribute some back to the pool. Those who constantly take from the pool of knowledge, without contributing to it, cannot avoid the accusation of "deadbeat," any more than they can in financial matters.

More important is the fact that only those who are capable of adding to knowledge, and are actively engaged in the process, are really capable of discharging the three previous responsibilities of a research bureau.

This paper has discussed the close connection between educational practice and educational research if education is to take care of its responsibilities within a professional context. It was suggested that the coordination between practice and research was best accomplished through a formal research organization that had at least four indicated responsibilities.

Role of the Principal in Research Programs in High School

ROBERT A. WEBER
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THE ROLE of the high school principal in a research program is not at all static but, depending upon the nature of the research, may consist of many separate and distinct roles. Although the nature of the research dictates to some degree the principal's role, his perceptions of himself as principal also may influence markedly the role or roles he plays. In order to inventory and delineate the multi-dimensional role of the principal the present discussion will attempt to (1) look at the various roles as they relate to various types of research undertaken and (2) identity roles in terms of the self-perception of the principal.

Although there is some disagreement about the nature of investigations which may be called "research" and those which may be called "studies" or "projects", for purposes of the present discussion the term "research" is used to designate any organized attempt to collect complete data pertinent to a specific topic. In using the term research in this way, however, the assumption is made that such an organized collection of data would embody the essential research techniques. That is, the expectation that the problem to be studied is well-defined, that the means of collecting data are valid and yield reliable information, that the ways in which the data are treated utilize accepted methods, and the conclusions or generalizations drawn are those which the data actually *do* support.

Kinds of Research

At least three major kinds of research programs might be carried on in a school. Probably the most needed and most fruitful kinds are investigations which attempt to collect information bearing directly on known or suspected problems in the overall operational and organizational policies of the school. No school seems to be without certain problems which are particularly vexing to all or part of the students, faculty, or administrators of that school. Many problems of this nature are frequently solved on a trial and error basis which serves to give the impression that no one really knows how to solve these problems. On the other hand, however, most problems can be solved satisfactorily the first time if pertinent data

are carefully studied and decisions then made. Because of the interrelationships existing between the philosophy of the school, its curriculum practice, and its grouping and promotion policies, almost all school problems are difficult to solve. As a satisfactory solution is effected in one of these areas, it, in turn, may seriously impinge upon the smooth operation of some other area. These relationships, therefore, generally increase substantially the scope of any investigation. But unless they are recognized, the likelihood of collecting inadequate or inappropriate information is always present.

The second type of research that might be undertaken is aimed specifically at some aspects of the instructional program. Seemingly, the faculty of most schools believe that ways exist to improve the learning opportunities for children through improving the kinds of instruction children are receiving. Many faculty members seriously desire to experiment with methodology; many are willing to experiment if given encouragement. Investigations of an "experimental" nature usually demand critical skills of research design and proper treatment of data. Perhaps this "experimental" type of research is more demanding of proper, precise, treatment of data than in any other type of research. Hence, investigators must have these skills.

The third major type of investigation in which a school might be involved is generally termed cooperative research. In this case, the school does not originate the investigation but is a contributor along with other schools, to the overall collection of data. Cooperative research seems to be increasingly common with graduate students, college and university personnel, or foundation research agencies actually designing the investigation, handling the data and drawing conclusions with individual schools serving as collection agencies. Similarly, schools may serve as the "experimental" situation in which persons not directly connected with the school actually direct the research.

Roles in Terms of the Nature of the Research

By virtue of the position he holds, the principal must play a leadership role. All persons connected with the school in any capacity expect the principal to give direction to the various enterprises of the school. This role is inescapable. In terms of research programs, therefore, the principal must, beyond question, assume responsibility for creating a climate in which research may be con-

ducted. This is not to say, however, that the principal must direct and conduct the research but is intended to point out that if research is to be one facet of the school's operation, the principal must accept the responsibility for setting the tone in which the project can move forward.

Aside from the generalized leadership role, other more specific roles must be played. These roles might be likened to sub-roles. One such sub-role is that of *precipitator* or *crystallizer*. The role seems particularly evident if the research is to focus on local school problems. Perhaps everyone connected with a school always wishes some changes could be made. Perhaps, in regard to some problems, tensions are great; everyone seems to know the problem exists but no one feels he wishes to mention it. In this situation, the tensions and irritations seem to continuously increase through the years. In his leadership role the principal must introduce discussion of the problem (s) and can, therefore, make it "legal" for staff members to discuss it. In this role he is a precipitator. His actions make it possible to crystallize and define problems which theretofore could not be discussed.

A second circumstance in which the role of precipitator emerges occurs when one or more staff members have, over a period of time talked more or less generally about a desire to undertake research of some kind yet seem unable to really make up their minds to do it. Frequently, the simple question "Why don't you go ahead?" is all that is needed to motivate action. In this circumstance, the principal has obviously played the role of precipitating action.

A second major role frequently emerges after research activities have been inaugurated. Many times after a study is launched it seems to bog down. Frequently research activities cease altogether. Perhaps this is a more or less normal reaction. This inactivity may result from lack of time, materials, direction, or one of many other reasons. To forestall a slowing down of activity, the principal must continuously be aware of those factors which produce this situation and must take definite steps to prevent them. As the principal "smooths the way" he assumes the role of *expediter*.

To play an expediter role effectively, the most essential factors are the continuous awareness of the status of the research and the ability to anticipate needs in advance. If continuous familiarity with the project ensues, the principal can anticipate needs in terms of time allotments, materials, equipment, personnel and a host of other factors. Because of his overall leadership position and his

liason role with the central office, he must make the necessary arrangements to provide whatever is needed in advance of the need.

A third major research-oriented role of the principal is that of *consultant*. Persons conducting investigations are always faced with making decisions about operational technique. Frequently these decisions are difficult and the opinion of others is desired. The principal of a school is the person to whom most staff members turn when opinions are needed. The principal, therefore, must be a good listener to play a consultant role, he must be able to grasp the significant aspects of the problem with which he may be only partially familiar and, in reality, help the researcher think through to the best decision. In a situation of this type, the principal is a "sounding board" for the persons engaged in the investigation.

A distinctly different consultant role may be played. At times, those actually engaged in the research may reach a point at which they may be in need of information or skills which they do not possess. As this situation emerges, the principal may be cast in a true consultant role by actually demonstrating or teaching the skills needed.

A fourth role the principal may play in a research program is one of *coordinator*. The coordinative role has several major aspects. A locally-sponsored investigation may require the energies of a number of distinct persons or groups contributing portions to the overall study. Although each person may work independently, the results of his efforts when pooled with others will dove-tail to produce an entire investigation. The school principal is the logical person to coordinate these efforts.

Similarly, the school may be engaged in contributing to a large investigation undertaken by a distant agency. The local school may be in the position of simply following the directions of the agency and forwarding data to it. Someone must coordinate local effort with the overall plan. Such coordination is frequently considered as the principal's role.

As research is completed, there is a need to evaluate the findings. By virtue of his leadership position, the principal is usually expected to engage in the process. His role then becomes one of *evaluator*. As an evaluator, no need exists to offer judgment about the quality of the research and its outcomes but rather, to evaluate the outcomes in terms of the local status and to place them in context. The evaluation may, in turn, indicate the need for further

investigation in the same general area or, as is often the case, in an area somewhat removed yet related to the present investigation.

The preceding discussion has attempted to enumerate the roles of the principal in terms of roles that might be played by one who is not a direct participant in the research processes. Another role dealing with direct participation in research might be that of *conductor*. There is no reason why the principal should not conduct an investigation himself. Many of the problems he must solve demand that he conduct research if they are to be solved with insight.

Along the same line as conductor, the principal may also assume the role of *cooperator*. As a principal actively undertakes a research project, he may assume responsibility for completing one segment of a larger study. Thus the data he collects may be amalgamated with those collected by others. Upon occasion the principal may work directly along with one or two other persons. In both of these cases he becomes a member of a larger group engaged in research. Because his efforts may be pooled with others he is placed in a cooperative role.

Thus, the role of the principal may consist of a combination of distinct, separate roles dependent upon the nature of the research and the way it might be organized in the local school. The principal must play each role at various times if a broad research program is to be carried on and is to be of value to those who are closely related to the school program. Although the roles enumerated have been those which seemingly grow out of the nature of research efforts within a school, other roles may be assumed in terms of the principal's self-perception.

Roles in Terms of Self-Perception

Because of the way the principal may see himself, several roles may emerge. Chief among these roles is that of *delegator*. Principals may feel unable to assume an active and/or even supervisory role in a research program because of time limitations, unfamiliarity with the field in which the investigation is being conducted, lack of information regarding the essentials of research processes or a host of other factors. Because of these items, the specific direction of and assistance to research may be delegated to one or more persons who have particular insights and skills needed in the successful completion of the undertaking.

Several problems arise, however, when the delegation of responsibility is undertaken. One major problem frequently arises

because the delegation of authority does not accompany the delegation of responsibility. That is, the person to whom the job has been delegated has no authority by which he can discharge his responsibility.

A second problem arises when the extent to which responsibility is delegated in not clearly defined. In this case the research may be partially supervised or conducted by the person delegated, but may also be partially supervised by the principal. As a result, therefore, the principal may be viewed as a "meddler" in affairs which he supposedly has already relinquished responsibility. As this circumstance arises, confusion results which tends to reduce substantially the research efforts.

A third problem arises because, through the delegation of responsibility, some other person has additional duties to perform. If, as seems always the case, the other person has already been carrying a full load of duties, he must either delegate some of those duties to others or spread his energies over a larger task. In either case, he may be faced with an impossible task; there may be no one to whom he can delegate some of his duties. Under this circumstance he must somehow attempt to discharge his added responsibility and the likelihood of doing a good job appears to be remote.

Summary

Research activity is essential in every high school if a continued improvement of learning opportunities is afforded adolescents. As the educational leader of the school, the principal is expected to initiate research activities. He may play many roles which are of a supportive and assistive nature to others actually engaged in research processes. He may actively engage in conducting research himself or he may delegate his active role to others. Whichever role he assumes among all of those possible, his interest in the research is of paramount importance to its successful conclusion.

Guidance Contributes to the School's Research Efforts

ROBERT N. WALKER

Director of Child Study and Guidance, Akron Public Schools

THE TRAINED secondary school counselor occupies an excellent position for making a substantial research contribution to the staff. There are several reasons for this:

1) *The nature of his training.*—The counselor should be competent in techniques of collecting, recording, organizing, reporting, and interpreting information about boys and girls. He should represent a high level of skill in the use of educational measurement devices and have a reasonable working command of the statistical concepts that give measurement its research value. Frequently, counselors have also received special training in specific kinds of research, for example, the study of drop-outs, follow-up of graduates, occupational interest studies, and the like.

2) *The nature of his staff assignment.*—The counselor is in an unusually excellent position to collect and organize useful information as a basis for research. He contacts pupils under conditions different from other staff members. He works with them individually and in groups around a wide variety of problem situations. He hears them express their worries, concerns, hopes, attitudes, feelings, and ambitions in a variety of ways that can be fed back to staff.

3) *The demands of his position.*—The counselor's less rigidly defined time schedule allows him opportunity to give attention to research activities.

Because of the advantageous nature of the counselor's position, he can make a very real, often unique contribution to the school's total research program. This fact is being more widely recognized by school administrators who are now employing their counselors in the research function. An example of this is in the following statement taken from job descriptions of the junior and the senior high school counselor in one school system*:

* From Bulletin 57-1 "The Guidance Program for Senior High Schools" and 57-4, "The Guidance Program for Junior High Schools", Child Study and Guidance Department, Akron Public Schools.

> "Uses appropriate research techniques to study nature and needs of in-school youth. Organizes and presents this material to those interested in planning for youth. Employs research techniques such as follow-up studies to determine the effectiveness of the guidance program itself."

There are two kinds of research in which the counselor can be involved with profit. The first kind is that which relates to the counseling and guidance program itself. It is the kind of research necessary for the constant evaluation of the guidance operation and it leads to the informed supervision and continual improvement of the program. Unless these techniques of self-research are employed from time to time, it becomes difficult to tell whether the guidance program is truly effective, whether it is actually meeting the needs of school youth, and whether it is appropriately contributing its unique function to the total school program.

There are several ways in which the counselor can muster data to give evidence of program quality. One is the use of formal evaluative criteria or check lists against which the program can be compared. Section "G" of the Evaluative Criteria of the North Central Association of Colleges and Secondary Schools and "Criteria for Evaluating Guidance in the Secondary Schools" of the U. S. Office of Education are two examples of the formal check list. Schools may want to construct their own check lists to assure that the program is being evaluated against the specific goals and needs of that particular school. The check list method can be broad, as in the study of a total guidance program, or it can be narrowed down to study a specific aspect of the program such as testing.

Another set of data relevant to guidance program quality comes from observing key things that are actually happening around the school. They will suggest, through what *actually happens* (or doesn't happen) whether things are well in guidance. Some of the clue-giving things to watch include[1]:

> How many students use the occupational information service
> What are the parent reactions to guidance that are overheard
> Whether there is a reduction in student discipline problems
> Extent to which students initiate guidance contacts
> Whether drop outs are reduced and attendance improved
> Increase in number of students making logical post high school plans

[1] See Erickson, C. E. and G. E. Smith, *Organization and Administration of the Guidance Services*. New York: McGraw Hill, 1947 for a list of about 25 such studies.

Still another way of looking at the guidance program through research eyes is to conduct client satisfaction studies. These studies are troubled by a number of technical difficulties and should be approached with caution, but even so, can yield useful data. The basic question they try to answer through either the questionnaire or interview method is the extent to which the service is meeting and satisfying the felt needs of its clients. The school counseling service must be careful to remember that it has *several* clients; teachers, parents, administrators, pupils, perhaps even others. Satisfaction studies must cover all these clients to avoid severely biased outcomes.

Some authorities[2] feel that to be truly effective, the counselor must play a dual role, that of both counselor and scientist. As scientist, he carries out continuing research in the counseling process in an effort to develop a more scientific underpinning to what is, at present, a largely intuitive procedure. These two roles can be reconciled, it is felt, so the research on counseling need not be relegated to the university clinic but can go forward wherever professional counseling is in practice. For the high school counselor who adopts this viewpoint, research has still another meaning beyond those suggested elsewhere in this article. It means also that he will be investigating aspects of the interview counseling process itself in an effort to improve himself.

A second area of research to which the counselor can address himself, and perhaps the more important one, is that which brings the unique contributions of the guidance program to bear on all aspects of the school; curriculum, instruction, extra-curriculum, even administration.

Perhaps one of the most valuable research efforts in this area can lie in the collection, organization, and interpretation to all staff of data describing the nature and needs of adolescent youth. Such data can be used advantageously in all aspects of the school operation to assure that course content and methods, administrative tactics, and the extra-curriculum are as consistent as possible with adolescent developmental patterns and psycho-educational needs. Sources of this type of information are varied:

Existing personnel records may be analyzed at depth
Routine tests yield valuable data often not used
Special aptitude, interest, and problem check list tests may be given for this specific purpose

[2] For example, see Pepinsky, Harold and Pauline Pepinsky, *Counseling Theory and Practice*. New York: Ronald Press, 1954.

Reasons for pupils' contacts with counselors, the problems they present, and the questions they ask may be analyzed

Study at depth can be made of certain "trouble points" in the school program such as failures, discipline cases, drop outs, etc.

The major purpose of all such studies would be to feed back into the ongoing operation of the school information that would lead to better understanding about adolescents, which in turn will be reflected in a total school program better equipped to enhance adolescent development and learning.

The school counselor may also be of major service in research related to the school-as-a-whole by assuming responsibility for certain of the more formal studies the school may wish to undertake. Froehlich points out* in discussing this counseling role in research,

> ". . . a high priority should be assigned to research because the guidance program is in a better position to conduct certain kinds of studies than any other service in the school. It is more economical, for example, for the guidance program to summarize the implications for curriculum revision of the findings of its follow-up study of school leavers, than for the curriculum committee to conduct its own follow-up survey. Or, at times, a counselor, by virtue of his training in statistics and tests and measurements, is the best qualified person on a school staff to conduct a study based on test results."

Major studies which a counselor might direct for a school include such things as the follow-up of all graduates or drop-outs or both for a given school year. These studies develop data about a school's end product which give penetrating insights into the value and effectiveness of the total school program. Such studies are frequently rather large scale, and collect an immense amount of data. They prove to be most effective if they are operated by someone with skill in research techniques.

"Quality control" studies making use of standardized test results is another major study area. In a recent report** of how 28 school systems representing a wide range of communities studied their educational problems, all but one stated that the use of

* Froehlich, Clifford, *Guidance Services in Schools*. New York: McGraw Hill, 1958, Page 324.

** See *The Quest for Quality*, a series of 14 pamphlets by Lewis E. Harris and Clyde B. Moore, published by the National School Boards Association and the American Association of School Administrators.

tests was prominent in their research. The wide variety of applications of tests and how they are interpreted is too well documented elsewhere to be covered here. Let it be said, however, that despite their limitations, tests remain one of our most powerful educational research tools.

Schools often wish to conduct community surveys as a means of assuring that staff knows and understands the community in which it works and that the school is attuned to community needs. Community surveys also are useful in finding and cataloging the wide variety of community information and referral resources that may be available to staff for a number of purposes. This is another type of research for which the guidance staff may take a large responsibility. Some of the studies of this type that may be profitably undertaken include occupational surveys, surveys of home conditions, population trend studies, community agency surveys, studies of resources of occupational information, socio-economic stratification studies, and many others.

Some counselors may make valuable contributions to their school's research efforts through acting as the statistical technician for the more formal efforts that might require well planned research designs and more sophisticated statistical work-ups. Such careful planning is almost always necessary, for example, when a school engages in some kind of experimentation in which experimental and control groups are to be compared. It is also usually necessary when careful research is to be based on standardized test findings, especially when important educational decisions are depending on the outcomes. Many counselors' training programs require a thorough grounding in statistics and research methods. The school whose counselor is so trained should make use of his special skills through research assignments.

The foregoing paragraphs suggest, as examples, only a few of the many research contributions a counseling and guidance department can make to a school. It is by no means implied that all, or even most, school research should be centered in the counseling office. Other faculty, contributing from the point of view of their own unique skills, have equally valuable contributions to make. The point here is that the total research effort of the school is certain to be enhanced if the special skills of *all* the staff are employed.

The Purposes and Goals of High School Research Programs

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IMPROVING THE teaching-learning process" has been the goal of teachers since the beginning of recorded history. This goal has been approached, with varying degrees of success, through research of many types. Reliance upon custom and tradition certainly represents a type of early research. Judgments drawn from one's own experience or reliance upon established authority represent other types of research which have been employed, while philosophical reasoning represents still another approach to research used in the past. Indeed, it has only been in recent years that scientific techniques have been applied to research in teaching. Thus, although research as a technique for finding better ways of doing things is as old as time itself, the early instruments of research offered only crude means of progress.

Even in this century research which related to secondary education reflected many of the less sophisticated research elements. The early committees who studied the American secondary school relied most heavily upon the value judgments made by the committee members themselves. Changes in the American high school were often based upon this type of meager evidence. Even in the very recent past, and indeed, even today much of the research concerning the American high school gives rise to serious concern because of the questions which may be raised about the techniques employed.

It must be noted, however, that research in the area of teaching is not so simple as one might expect. The teaching-learning process itself is most complicated. Research activities, therefore, which purport to deal with this issue must also be complicated. Progress through research, then, is a slow, never-ending process in which research simply leads to more research.

Yet, research programs at the high school level are not often found. This is true in spite of the fact that at this level research

may serve a most valuable function. Indeed, more high school research programs must be initiated if progress is to be made in improving the quality of secondary school instruction.

High school research programs, regardless of the direction these programs may take, must have one primary goal—the improvement of the educative process. As already indicated, however, this process is so far-reaching and so complex as to be a canopy under which many specific goals may be identified.

Probably the most significant specific goal of a high school research program is to provide basic knowledge concerning the teaching-learning process. The continual search for truth which is beyond the realm of the known is a necessity for progress in any of the disciplines. Research which may yield basic knowledge is often called pure or basic research, and its primary goal is to extend man's understanding. It may be contrasted with practical research where the goals are clearly defined and results immediately usable. Basic research, by its very nature, is a slow process which will lead the researcher in many seemingly fruitless directions which may or may not produce, eventually, worthwhile results. It must seek truth wherever and however that truth may be found. The end of basic research is simply more research.

Examples of basic research may readily be seen in the field of psychology. The many psychological studies of the nature of the learning process have been contributed to a body of truths in this area. Some of these truths have had immediate practical value in education; others have not. The net result has been, therefore, simply to open the way for further research in such topics as motivation and measurement of mental abilities.

Basic research is one of the most difficult types of activity to carry on in the typical high school research program. In the first place, it requires the greatest skill on the part of the researcher who must employ sophisticated techniques. He must be trained not only to organize research activities in such a way that valuable results may be obtained but also to interpret properly the data collected. Secondly, local school boards, generally, are hesitant to authorize or to support financially research activities from which immediate, practical results are not obtainable. Furthermore, those responsible for research activities on the high school level often feel the tremendous pressures associated with the operation of a high school program to the extent that basic research is seldom undertaken.

Although basic research must be recognized as one of the primary goals of high school research programs, the complexity of this type of research combined with the practicalities of public school work make it one of the most elusive.

A second important function of high school research is concerned with the evaluation of programs and practices already in existence. Far too often schools make no attempt to evaluate what they are accomplishing, being content in the conviction that they are doing what is right. On the other hand, changes may be recommended and put into practice without sufficient research justification that the change is needed or even an indication of the direction a change should take. Change is inevitable and must occur in every school system. As the goals and nature of society change, so must the objectives, programs, and practices of the schools change if the school is to serve its most important objective. However, to approach the pursuit of excellence and satisfy the demands of society, one must first know and understand his own situation.

The approach to such research will vary according to the criteria selected for the evaluation of the present practice. Ideally, however, all criteria upon which the school bases its objectives should be involved in a total evaluative process if the picture is to be complete. Because of practical limitations, such an extensive research program is seldom possible. Do all students receive a general education suitable to criteria set forth for such education? Are the teaching practices achieving maximum effectiveness? Are students being prepared to enter college? These are but a few of the areas that must be evaluated continually, yet each such evaluation would require considerable planning and effort. Thus, frequently one phase of the school program is studied at a time.

With this piecemeal research as a distinct possibility, research involving present practices becomes even more complicated, the results of which may become progressively more confusing, rendering accurate conclusions more tenable. For example, if research should indicate that a change in a certain practice is advisable, efforts should be directed toward the accomplishment of this change. Assuming that the practice is altered, then its effect will be reflected in the total educational situation. A second research project involving perhaps a second area of concern would then automatically be within an atmosphere different from the first. This amplifies the necessity for thorough planning of the total research program.

A third goal of high school research programs is to explore

and determine the advisability of adopting new practices. As mentioned previously, change is essential for maximum effectiveness, yet practices which represent the change must not allow the student to suffer. There must be every indication that the proposal will be at least as effective as the one being replaced plus the good possibility of its serving a more valuable purpose.

Two steps are generally undertaken in the search for improvements in the secondary school. These may well be illustrated in a hypothetical search for a more effective mathematics curriculum in Goodmath High School. After ascertaining a need for improvements in the mathematics curriculum in their school, the Goodmath teachers and staff began a thorough study of each course. The study included analyses of mathematics research projects carried out in other school systems through the country and consultation with mathematicians and mathematics educators from institutions of higher learning. The result of their study was a recommendation for a new approach to the teaching of mathematics in the secondary school, with syllabi being prepared for each course.

The teachers, administrators, and consultants involved in the Goodmath High School study were convinced that students taught in the new mathematics courses would obtain, at the minimum, as great an understanding of concepts and facility in mathematical operations as they would in the old course. In addition, however, they predicted even more success with the new courses. With these factors in mind, experimental classes using the new approach were organized.

Even though the high school had an enrollment of 2,500 students, only 150 students were placed in the experimental courses. There were two classes of Algebra I, two of Plane Geometry, and two of Algebra II, with each of these being compared with a control group. Extensive testing was carried out throughout the year and all results were given adequate statistical treatment. In addition, teacher evaluations, student opinions, and parental opinions were obtained. Because of favorable results from this research project, Goodmath High School made the decision to adopt the new mathematics approach. This, then, was the second step in the identification and evaluation of new practices.

Once a new practice has been adopted and put into effect in a school situation, it must be carefully evaluated to ascertain the potential for continuing effectiveness. Thus, the fourth goal of high school research programs is to verify the effectiveness of new prac-

tices in terms of the criteria upon which they are based. A grave danger exists when one becomes over confident in his convictions, yet this happens in public school situations. The Goodmath High School staff, after becoming totally involved in the mathematics curriculum study and with the evidence from the very precise research project involving the experimental classes, could easily fall prey to over confidence in their program. Once the new program has been expanded to the entire school, the situation would change entirely. There would be more students and teachers involved, the experimental "excitement" would subside and outside interest would wane. The very atmosphere would change. It is at this point that research is, indeed, most important.

Quite naturally, the nature of this research and the techniques used will vary with the situation, yet in every case, research should cast light upon the effectiveness of the new practice in terms of criteria selected for justification of the practice. To organize core classes with one major objective being integrated learning experiences and then to evaluate the effectiveness of these courses using techniques which measure only unrelated skills would be sheer folly. None of the results could be used to validate the effectiveness of this new organization in terms of the criteria. Thus, once again, careful planning is an essential factor.

A fifth, sometimes overlooked objective of high school research programs is to provide an excellent source of in-service work for the school personnel. It may provide opportunities for the teachers and administrative staff to (1) thoroughly study and explore the total high school curriculum (2) seek improvements in both administrative and teaching methods, and (3) develop a general enthusiasm and motivation for improving the entire educational process.

For any school to function at maximum effectiveness, all personnel involved in the educational operation of that school—teachers, supervisors, and administrators—must understand and believe in the philosophy and objectives upon which the school is based. They must know and understand why a particular curriculum is being followed and the factors contributing to the success of this curriculum. They must see and comprehend the whole and the relationship of its parts. Far too often this is not the case in public school situations and as a result the school does not achieve maximum success. Research programs may, if organized properly, focus the attention of the school personnel on the total educational process.

Research programs may serve another purpose in that the intellectual horizons of those concerned stand a good chance of being broadened. A traditional belief in public education, whether well founded or not, is that once the teacher closes the door of his classroom he is the king of his student kingdom. Such a concept tends to develop over confidence in the effectiveness of one's teaching methods, and this may lessen the desire to seek other, better teaching techniques. This may account, in part, for the number of teachers in public education, who, having taught ten or twenty years have had only one year of genuine teaching experience. Research programs allow the teachers an opportunity to look around, to see what is being done in other school systems, and to identify and try out new teaching techniques. Thus, well organized high school research programs may broaden the intellectual horizons of the personnel involved.

Interest and enthusiasm developed through research programs comprise another valuable asset to the school involved. Not only will these programs stimulate interest among the teachers involved in the particular project, but they may have an electrifying effect to the entire school. Esprit de corps in any faculty is desirable, and programs which obviously seek to improve the educational processes will undoubtedly be a major source of this feeling.

A final goal of high school research programs is to provide a medium for public relations. Public educators can never forget for whom their schools are operated. A far reaching philosophy of American public education has involved the public in the operation of the schools, and this should continue. It is, therefore, the duty of the school staff to keep the public well informed about what is being done in their schools. Research programs, properly publicized, serve as an excellent source of information for the public. Perhaps even more important, however, is that well organized and executed research programs will develop the confidence of the public in the operation and administration of their public schools.

Parents and the general public use many different criteria to form their own opinions of a particular school or of the total school situation. Naturally, they want to feel that their schools are doing the best possible job of educating the young people of the community. Good research programs will undoubtedly assure greater understanding on the part of the citizens of any community.

New Opportunities for Educational Research

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ONE focus of criticism in the current reappraisal of secondary education has been the teacher education programs of our universities and schools of education. More than one prominent public figure has suggested that time spent in these programs could be put to better use in graduate study of a subject specialty. I must confess a certain sympathy with this point of view, for I have been through such a program, and am hard pressed to recall an instance when a formal principle of learning, as taught in the University, helped resolve a classroom problem, whether on the ninth grade level or in a graduate course. The job of becoming a teacher has seemed more of a (sometimes painful) process of trial and error than an application of principles. It is as if every class day was a little experiment, and by succeeding often enough one gradually achieves an approach to instruction which, if not the best, is at least one that both teacher and student can live with.

I look forward to the day when the new teacher will have at his disposal a great enough body of fact about learning and teaching to shorten and ameliorate this process. But for the present, so little is known about the relative value of various approaches to instruction, particularly at the secondary school level, that few really specific recommendations can be made to prospective teachers. We seem forced to admit that we live in a society with vastly more scientific knowledge about the nurture of plants and animals than about the nurture of our children. (Agriculture is one area where we are unquestionably ahead of the Russians.)

For persons interested in improving education there is something to be learned from this contrast of the progress of education with that of agriculture. For it is a fact that the problem of deciding which of various methods of instruction will produce greater achievement among students is in many ways similar to the problem of deciding whether one agricultural method gives greater yield than another. In both cases the factors which influence response to the alternative methods are extremely complex, so that general principles seldom predict with certainty which will be su-

perior. The only way to choose the better method is to perform what the agronomists call a "field trial"—a comparison of the two methods under the actual conditions of use.

But it is as true in education as in agriculture that experimental trials of this sort are extraordinarily difficult to carry out successfully. They need to be done on a very large scale, state wide or nation wide, in order to allow for the local effects of schools and neighborhoods, on the one hand, or of soils and climates on the other. Moreover, several years of work may be required for a single experiment when the response under study develops slowly. The experimenter must also go to great length to anticipate and to suppress the many sources of bias and error which contaminate effects due to true differences in the methods. This is especially the case in education and agriculture since even a small improvement in method, difficult to detect in the presence of error, can assume great importance when applied on a state or nationwide level.

Nevertheless, the success of experiments under just these conditions, as much as any other factor, has lead to the pre-eminence of this country in agricultural production. If we look more closely at how the agronomists were able to manage this *coup* (with the idea in the back of our minds that we might emulate it), we find two important sources of their success. One is the continuity and size of the support which schools of agriculture have had in practically every state in the Union. Together with the active cooperation of farmers and farm organizations, this has made experiments on a sufficiently large scale possible. The other is that in close conjunction with agronomy, a rigorous theory has developed of how to perform and evaluate experiments in the presence of error. This theory has been so important in agricultural research and many other areas that it deserves special comment.

Usually the theory is referred to as the "design and analysis of experiments." It got underway in England in the 1920's and was quickly imported into the United States. Since then it has developed in many directions, but the original contributions remain the most important. They are 1) ways of designing experiments which make possible simultaneous evaluation of more than one feature of the methods being tested (technically, "factorial designs"); in educational research where the number of students or classrooms available for an experiment may be limited, these designs give much more detailed information than the traditional experiment where one feature is varied at a time; 2) provision for

identifying and eliminating sources of error which obscure differences in the methods under study (technically, "blocking"); 3) a technique of arranging the experiment so that it conforms to a well understood statistical model (technically, "randomization"); the importance of randomization is in making possible a calculation of how large a difference in the response to two methods must be deserved to be clearly distinguishable from error.

The success of the agronomists' field trials conducted by these principles has not escaped the notice of workers in education. In the 1930's Palmer O. Johnson at the University of Minnesota began to introduce design and analysis of experiments into educational research. Texts by him, E. O. Linquist and others made the theory available and some studies were carried out in this rubric. There was one flaw in the program of research, however. It soon became apparent that an important aspect of testing competing methods of instruction was quite different from testing alternative agricultural methods. In most cases the agronomist has to consider only one measure of the value of an agricultural method—namely, the yield of plants or animals produced. The educator, on the other hand, has almost a moral obligation to consider the effect of alternative methods on all areas of the students' achievement. He must not restrict his attention to achievement in a single subject, even when the methods of instruction concern only one. To do so would risk improving achievement in one subject at the expense of the others. A timely example is the current controversy over teaching reading phonetically rather than by sight. It is quite possible that the phonic method could improve spelling and oral reading, but at the same time be detrimental to achievement in subjects which require rapid silent reading. An empirical trial of the two methods could hardly be considered complete if it did not include measures of achievement in all related parts of the curriculum.

Technically, this means that experimental studies in education are inherently "multivariate" in contrast to the "univariate" studies in agronomy. In the multivariate case the principles of experimental design apply in the usual way, but the analysis appropriate to the data is different. As late as 1950 the problems of performing multivariate analyses had not been completely worked through and it would hardly have been possible at that time to apply the techniques of experimental design and analysis to realistic educational problems. After 1950 two remarkable developments changed this picture completely.

One was the culmination by S. N. Roy and his students of the theory of multivariate analysis, begun many years earlier by S. S. Wilks. This produced a form of analysis which fits so neatly into the existing theory of experimental design that persons familiar with the latter from, say, Johnson's or Linquist's texts, find it easy to learn and make use of the new analysis. The other, and equally important, development was the appearance of commercially available electronic computers. Because of the large amount of data involved in a large scale educational experiments and the complexity of the calculations required to analyse the difference between the instructional methods under trial, the time and cost of computation by hand methods would be entirely prohibitive. Since computers have been available the arithmetical analysis of large amounts of data is a minor problem.

For educational research these developments could not have come at a more opportune time. We are in a period when professional educators and public alike have a sense of urgency about education which is sufficient to support vigorous and well organized empirical research. We have a growing number of persons trained in experimental education and equipped to handle the technical problems of experimental design and analysis which are central to such research. In the background, we have a highly developed technology of mental testing which can provide the necessary measures of achievement. Finally, we have from all sides a wealth of suggestions about how to improve education and instruction. For the first time it is within our means to choose among them, not by mere guesswork or capitulation to expediency, but by giving sincere suggestions a fair trial and judging them by their fruits.

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